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AD NUMBER
AD843798
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AD 843798

TRANSLATION NO. 3096

DATE: 8 January 1968

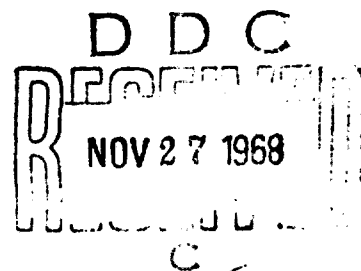
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DEPARTMENT OF THE ARMY
Fort Detrick
Frederick, Maryland



TECHNICAL MINIMUM COURSE ON PEANUT-GROWING

Application of the Technical Minimum Principle to Peanut-Growing

Curso Minimo Tecnico: Cultivo del Mani
(Technical Minimum Course: Peanut-Growing)
Department of Education and Publication -
Education Section,
Instituto Nacional de la Reforma Agraria
(National Agrarian Reform Institute),
Havana, 1962, pages 1-32 (pages 30 and
31 omitted)

Unsigned

UNIT 1

Soil Selection

For their best growth, peanuts require light soils with good drainage and with a pH above 6. In soils with a pH lower than this, that is, more acid soils (determined in the laboratory), the pH will have to be adjusted by means of liming, which will be done, when necessary, prior to planting. Although liming will be determined by the results of analysis, it can be accomplished at the rate of two or three tons per hectare.

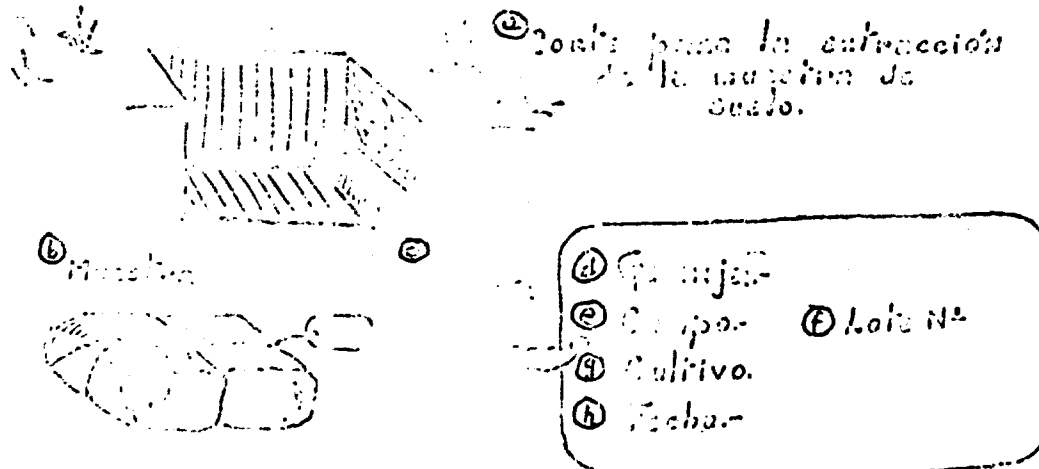
Owing to the above-mentioned conditions, in selecting the soil for this crop it is necessary to take into account each one of the conditions, since the absence of one of them would be detrimental to the production of the crop.

Sample-Taking

The first step in the determination of the pH and in performing soil analysis is sample-taking. In performing this operation, we must attempt to take necessary steps to bring to the laboratory soil portions that are faithfully representative of the soil in question. Therefore, we must operate in the following manner:

1. Remove from the surface the organic remains that are always there (weeds, rubbish, etc.) by scraping with a spade or shovel.
2. Make a cut in the soil and take an approximately four-ounce sample of the plant layer. This operation is repeated on the plot as many times as there are soil types or in eight or ten different places.
3. All the samples obtained are mixed and one or one and a half pound of them is weighed, wrapped in heavy paper and sent to the laboratory, perfectly tied up and labelled.

For taking samples of the subsoil (layer below the top-soil), the procedure is the same as for the plant layer, taking care in extracting the sample so that it will not be mixed with parts of the first samples.



Remark

Care must be taken in mixing the samples not to do so with the hands, since the sweat on the hands alters the results of the analysis. Likewise no smoking should be done when the samples are extracted or mixed, since a small amount of ashes falling on them causes a change in the results.

Preparation

The preparation of the soil requires special attention for all crops. Because of its characteristic of growing its fruit within the

soil, the peanut plant requires painstakingly prepared earth. This can be achieved by going down 15 centimeters (6 inches) in the first plowing (on breaking) in soils that permit it and down to 25 or 30 centimeters (10 to 12 inches) on crossing (second plowing).

Following each plowing, the harrow will be passed over as many times as may be necessary. Once this has been accomplished and the earth is perfectly loosened, it can be levelled with one or more passes of the land-plane (levelling machine).

There must be sufficient time between each preparation so that weeds and harvest remains buried by the preparation may rot and also so that "blowouts" may occur and so that the soil may receive adequate weathering. The total preparation time must never be less than thirty days.

In all soils, and especially in soils with a thin humus layer, the plowing depth must be increased gradually, in order to continue to incorporate small portions of the subsoil in the soil. This will gradually increase the thickness of the plowable layer.

The amount of subsoil incorporated on increasing the plowing depth must be in proportion to the thickness of the plowable layer. The thickness of that layer must never be greater than 15%. For example, if the depth of the soil (plowable layer) is 30 centimeters, the increase in plowing depth should not be more than 4 centimeters. When this operation of subsoil incorporation is performed, organic matter will have to be applied, or, if it is lacking, it will be necessary to increase the amount of fertilizer (chemical fertilizer) that is usually being applied by 15%.

Planting Time

There are two planting times specified for peanut-growing in Cuba:

- a. Spring or water planting, which is performed in March, April and May, depending on the rainfall, although preferably it should be performed in May.
- b. Cold planting, which is accomplished in August and September. Thus the crop can take advantage of the last water from the rainy season.

Seeds

Only a high quality seed and of known origin should be used in planting. It will be treated with an adequate disinfectant, like Arasan, Orthocide, Aspergon, etc., in a proportion of four ounces to every hundred pounds of seed.

This treatment protects the seed before germination and the small plant in the first days after sprouting.

The use of shelled peanuts for seeds is to be recommended. Special care is to be taken in handling the seeds to avoid damaging them.

When these seeds are used, it is necessary to plant as soon as possible after shelling.

Varieties

Although there are many varieties in the country, the best one recommended for growing in Cuba is the Valencia variety, also called Chinese peanut in some places.

Planting

Peanuts can be planted at a distance ranging from 80 to 90 centimeters (32 to 36 inches) between furrows and 8 to 12 centimeters (3 to 5 inches) between holes, putting the seed at a depth of 8 centimeters (3 inches). The operation of planting can be performed by hand or by machine and requires 14 to 16 hundredweight per *caballeria* [33.2 acres].

Planting peanuts in the form of a bed is not recommended.

Cultivation

The cultivation procedures that are followed from germination to blooming time have a great effect on the growth and yield of the peanut plant.

After germination has occurred, cultivation will begin. It is done as frequently as necessary to the earth turned over, to remove weeds, and to attempt to control the soil depth in order not to damage the roots. When a spade is used to perform some operation, care must be taken not to kill the plants.

Once the field has begun to bloom, cultivation must be stopped. In case it is necessary to weed, this should be done by hand, taking particular care not to move the plant or the soil near it.

Cultivation of the peanut plant requires great
care to avoid injuring the pods

Fertilization

In case the soil to be utilized requires the application of organic matter, this should be done when preparation of the soil is begun. The organic matter to be incorporated should always be entirely decomposed.

Once a need for fertilization has been determined by means of analysis, chemical fertilizer should be used in accordance with the formula 8-10-12, 7-15-7 and 8-10-10, at the rate of five to six tons per *caballeria*.

When planting is done by machine, the fertilizer will be deposited in bands in both sides of the side, two inches from the seed and at a depth of four inches. The seed must never be in direct contact with the fertilizer.

The application of six tons of calcium sulfate (gypsum) per *caballeria* is also recommended, dusting it over the plants forty to forty-five days after sprouting.

UNIT 3

Pest Control

Peanut plants are attacked by various insects like leafhoppers, thrips, chrysomelids, lepidoptera larvae (moth), and by leaf spots caused by fungi (*cercospora* and *Puccinia*).

The following application is recommended to combat and control attack by insects and diseases.

First Application

This will have to be done seven to ten days after the plants have sprouted:

DDT, 25%	$\frac{1}{2}$ gallon
DDT, 50%	2 pounds
Parathion, 85%	6 ounces
Parathion, 15%	1 pound
Basic copper sulfate, 53%	1 pound
Urea	3 pounds

All these products will be used in 100 gallons of water. The amount of solution applied is 1,200 gallons per *caballeria*.

Second Application

This will be done between twenty and twenty-five days after the plants have sprouted, with the following products:

Wettable sulfur	8 pounds
Toxaphene (8 pounds/gallon)	$\frac{1}{4}$ gallon
Urea	4 pounds
Water	100 gallons

This mixture is used at the rate of 1,600 gallons per *caballeria*.

Third Application

This will be done thirty or thirty-five days after the occurrence of germination, using the following ingredients:

Wettable sulfur	12 pounds
DDT, 50%	2 pounds
Parathion 15	1 pound
Water	100 gallons

This mixture will be used in a proportion of 1,800 to 2,000 gallons per *caballeria*.

Fourth Application

This will be done forty to forty-five days after the plants have sprouted.

Wettable sulfur	15 pounds
DDT, 50%	2 pounds
Dithane Z-78	2 pounds
Water	100 gallons

This mixture is used in an amount of 2,200 to 2,400 gallons per *caballeria*. If another attack should occur fifty or fifty-five days after germination, another application will be made, using the fourth application mixture.

Note: When it is not possible to make the applications in liquid form, the following formula will be used (in powder):

A mixture of DDT 10%, copper 3.4% and sulfur 70%, at the rate of one and a half pounds per *cordel* [about 0.1 acre] in the first and second application and two pounds in the subsequent applications.

These applications must be made at the same time as if they were in liquid form.

Watering

Generally not applied to this crop.

Harvesting

In order to be able to make an accurate determination of the time at which harvesting should start, it is well to make a sampling of the field to observe the state of the pods. When eighty of every hundred show a darkening of the inside walls, they indicate that the opportune time for harvesting has arrived. Sampling should start eighty days after germination. It is recommended that a harvester or puller-shaker-aligner be used for harvesting. It does a better job, if a rotary cutter is run over the field first. Not over three days should elapse between the operation of cutting and harvesting.

When a picking-machine is available, a V-shaped (hen-foot) weed-hook can be used for picking by passing it through the furrow for the purpose of extracting the pods.

If the weather should be rainy during picking time, the peanuts are piled up, after being dried by shaking the clumps. They are piled with pods upwards and in rows to dry, thus facilitating their mechanical threshing, which will be accomplished in the next three or four days.

When picking is done by hand, with good weather it will be necessary to wait six to seven days to do the threshing.

Yield

By following the recommended procedures, it is possible to succeed in obtaining yields greater than 400 hundredweight per *caballeria*.

DEPARTMENT OF EDUCATION AND PUBLICATION
INRA
TECHNICAL MINIMUM COURSE: AGRICULTURE-LIVESTOCK RAISING
PRACTICAL LESSONS

UNIT 1

Subject: Soil selection.

Lesson Plan

Objectives

- a. To instruct the students in the manner of selecting plots of land from which to obtain soil samples to be sent to the INRA laboratory.
- b. To teach how to interpret the results of soil analysis by means of tables prepared for that purpose.

Implements and materials

1. Digger.
2. Shovel.
3. Spade.
4. Heavy paper.
5. Label addressed to the INRA laboratory.

Reference: Instruction for taking samples and pH tables.

Preparation

1. Select the plots from which samples are going to be taken.
2. Prepare the tools that will be used, keeping them within reach on starting the class.
3. Provide the necessary charts or tables. The charts and tables will be displayed so that the student may have an idea of how to obtain soil samples to be sent to the laboratory, as well as how to interpret the results of the analysis.

The class will be given an explanation, emphasizing the great importance of a knowledge of the analysis, before establishing the peanut crop, because this is indicative of whether or not it is necessary to fertilize and lime the soil.

Presentation

Charts and tables will be shown so that the student may have an idea beforehand of how to obtain soil samples to be sent to the laboratory, as well as how to interpret the results of the analysis.

Application

The students will take the implements indicated by the instructor and will proceed to mark and obtain soil samples from selected plot, in accordance with the instructions given them. The samples that are taken will be mixed in accordance with instructions and will be suitably prepared for being sent to the soils laboratory of INRA and appropriate analysis.

The students will interpret the tables and charts on pH and proportions of the main factors contributing to the growth of the plant, with emphasis on the ones that are most important for growing peanuts.

Examination

The instructor will ask the students questions on the method of taking samples from various plots of land and reasons recommending it. He will observe and evaluate the ability and skill of the students in obtaining and handling soil samples.

He will have the students interpret on the charts the factors that contribute principally to the nutrition of the plants, emphasizing the ones that the peanut plant most needs for its growth.

UNIT 1

Subject: Soil preparation.

Lesson Plan

Class: Perform the work of plowing.

Objectives

- a. To teach the students how to plow the ground selected for peanuts.

- b. To teach the students how to hitch up and adjust the plowing implements.

Implements

Equipment and implements for plowing.

- a. Tractor.
- b. Plow.

Preparation

1. Select the plot of ground on which the plowing exercises will be held.
2. Arrange beforehand the stationing of the students in places from which they can observe perfectly the procedures to be carried out.
3. Try to have the equipment and implements required at the place for the exercises, in order to carry them out on time and in the specified manner.

An explanation will be given to the class, stressing the great importance that adequate plowing of the ground has for the crop.

Presentation

1. The instructor will indicate to the students on the tables and charts the various systems for plowing ground utilized for growing peanuts.
2. He will point out the desirability of using, in plowing, equipment and implements in accordance with the plasticity and the levelling characteristics of the soil.

Application

Under his guidance, the instructor will have the students proceed to plow the ground, taking into account the tilling depth, depending on planting times and physical characteristics of the soil.

At the same time as they perform the tasks of plowing, the students will observe the work done by the equipment. The instructor will stress the fact that it is necessary for the plowing to be done against the slope of the ground to avoid having the soil carried away by irrigation and rain water.

Examination

The instructor will ask the students to identify and determine on the charts various types of tillage and plowing on soils that will be devoted to growing peanuts, in accordance with their physical characteristics and the time of planting.

The instructor will also ask the students to specify the equipment and implements to be used in plowing, explaining the reason for the choice.

UNIT 1

Subject: Soil preparation.

Lesson Plan

Class: Perform harrowing, first and second plowing, levelling and furrowing for planting.

Objectives

- a. To instruct the students on the manner of harrowing.
- b. To instruct the student-workers on the time and manner of performing the crossing operation (second plowing).
- c. To teach the students how to perform the tasks of levelling and furrowing the planting ground.

Implements and materials

1. Harrow and traction equipment.
2. Plow and traction equipment.
3. Levelling equipment.
4. Furrowing equipment.

Reference: *Peanut-Growing*, Technical Department of INRA.

Preparation

Select the plot on which classes are to be held, making sure that the equipment and materials needed to carry on the class are there.

Prepare the charts and illustrations needed during the growth of the crop with the tasks involved in soil preparation.

Presentation

By making use of the charts and illustrations, the instructor will show the students the proper way to perform the operations of harrowing, plowing, levelling and furrowing the planting ground.

He will show the students how to adjust the equipment on the traction machine.

Application

By making use of charts, the instructor will have the students take note of the proper methods for performing the operations of harrowing, plowing, levelling and furrowing.

In accordance with the instruction that they have received, the students will proceed to hitch up and adjust the equipment and they will observe, on the fields being cultivated, the operations performed by the equipment, taking note of the conditions under which these operations are carried on, depending on the characteristics of the ground.

Examination

The students will answer question on adjustment of the equipment and they will also indicate the systems applicable to each of the tasks.

The instructor will take sufficient data from the replies to the questions asked, as well as from the exercises held in adjusting the various items of equipment, to evaluate the knowledge and skills acquired by the students.

UNIT 1

Subject: Seeds.

Lesson Plan

Class: Selection of seeds and their disinfectants.

Objectives

- a. To instruct the students in the manner of selecting the best seeds.

- b. To instruct the students on how to select the disinfectants with which the seeds will be treated.
- c. To instruct the students on the proportion and way in which the disinfectants should be applied and the precautions that must be taken in carrying out disinfection.

Implements and materials

1. Equipment for seed disinfection.
2. Adequate containers for seed disinfection.
3. Seeds and disinfectants to be utilized.
4. Charts and illustrations on the selection and disinfection of seeds.

Reference: *Peanut-Growing*, Department of INRA [sic].

Preparation

1. Selection of seeds, taking care to have them on hand when the class begins.
2. Selection of the various disinfectants and their preparation for applying them proportionally.
3. Preparation of charts and illustrations to be utilized in class.

The class will be given, stressing the importance of the right choice of disinfectants and their proper application to the seed.

Presentation

The instructor will show the charts and illustrations on the selection and disinfection of seeds.

The instructor will teach the students how to select disinfectants and their proper application to the seed.

He will show the students the proportion and manner of applying the disinfectants and the precautions that must be taken in performing disinfection.

Application

After the seed has been selected, the students will proceed to disinfect it in the proper proportion and manner.

Examination

The instructor will ask various students questions on selection both of seeds and of suitable disinfectants.

The instructor will ask questions on the proportion in which the disinfectants should be utilized.

UNIT 1

Subject: Planting peanuts.

Lesson Plan

Class: Planting operations. Calculation of amount of seeds.

Objectives

- a. To instruct the students on hitch up and adjusting the planting machines.
- b. To teach how to handle the seed and how to adjust the seed distribution plate.
- c. To instruct the student-workers on the operation of planting by hand.
- d. To teach how to calculate the amount of seeds to use, depending on the size of the planting field.

Implements and materials

1. Planting machine and traction equipment.
2. Receptacles or containers for seeds.
3. Seeds.
4. Charts and illustrations, showing the various planting systems.
5. Tables for calculating the amount of seeds.

Reference: *Peanut-Growing*. "Soviet-Cuban Meeting on Various Crops."

Preparation

1. Select the plot where the class is to be held.
2. Make sure that all the necessary equipment will be available at class time.
3. Prepare the containers needed to bring seed to the field and calculate the amount of seed that will be needed.
4. Prepare and arrange the charts, diagrams and tables to be used as illustrations for the class.

The class will be given, stressing the importance of this operation in the growth and production of the crop, indicating the principles of the various planting systems. The advantages of a machine in this operation should also be pointed out.

Presentation

The students will be instructed on the manner of properly hitching up and adjusting the equipment to be used in this operation. The instructor will teach how to make the calculations of the amounts of seeds needed, as well as how to perform the operation of planting with the various systems utilized.

Application

In accordance with the explanations received from the instructor, the students will proceed to hitch up and adjust the planting equipment. They will also make the proper calculations to determine the amount of seed to be utilized for a specific area, and they will perform exercises on the various planting systems to be used for peanuts.

The students will be guided in the operations by the instructor.

Examination

The students will answer questions asked by the instructor and will perform the practical exercises indicated by him. This will enable the instructor to make an evaluation or verification of the knowledge, ability and skill acquired by the students.

UNIT 2

Subject: Peanut cultivation operations.

Lesson Plan

Class: Cultivator runs.

Objectives:

- a. To instruct the students in hitching up and adjusting the cultivation implements.
- b. To teach how to perform the cultivator runs correctly.
- c. To instruct the students how to use the spade and how to perform hand weeding.

Implements and materials

1. Traction equipment and cultivator implement.
2. Spade.
3. Charts showing cultivation operations and hand weeding.

Reference: Soviet-Cuban meeting on various crops.

Preparation

1. Select the plot on which the classes will be held.
2. Prepare the equipment to be utilized and ensure that it will be available when the class is held.
3. Prepare and arrange the charts and diagrams to illustrate the class.

The class will be given, stressing the great importance of cultivator runs, spading and hand weeding to the crop.

Presentation

The students are to be instructed in the proper manner of hitching up and adjusting the equipment to be utilized.

The instructor will show how to make cultivator runs, how to spade or weed by hand, pointing out the importance and effect of these operations on the growth and production of the crop.

Application

In accordance with the directives given by the instructor, the students will perform exercises in hitching up and adjusting the cultivating equipment, as well as performing work with it. They will also perform spading and hand weeding tasks.

Examination

The instructor will derive from the work performed and the questions answered by the students the data needed to evaluate the knowledge and skills acquired by the students.

UNIT 2

Subject: Fertilization of the peanut crop.

Lesson Plan

Class: Application of fertilizers to the peanuts.

Objectives

- a. To instruct the students in machine fertilization of the peanut crop.
- b. To teach how to adjust the fertilizer distributing hopper.
- c. To instruct the students on hand fertilization.
- d. To instruct the students on the calculation of the amount of fertilizer to be applied per unit of area.

Implements and materials

- a. Traction equipment and fertilizer spreading machine.
- b. Sacks for carrying fertilizers.
- c. Fertilizers.
- d. Charts and tables.

Reference: Soviet-Cuban meeting on various crops. Technical Department of INRA.

Preparation

1. Select the plot on which fertilization classes will be held.
2. Prepare the fertilizer spreading machine and have it available when the class is held.
3. Have containers available for carrying fertilizers to the field for practical work.
4. Prepare and arrange the charts and tables with which the class will be illustrated.

The class will be given, stressing the great effect of fertilization on the growth and production of peanuts and pointing out the importance of proper procedure in the application of fertilizers.

Presentation

The instructor will teach the students the proper way to apply fertilizers by machine, instructing them on the adjustment of the fertilizer hopper.

He will instruct the students in fertilization by hand, teaching them how to calculate the amounts of fertilizer to be applied per unit of area.

Application

In accordance with the directives given by the instructor, the students will proceed to adjust the fertilizer hopper and to perform exercises on fertilization by machine and by hand. With the aid of tables, they will also calculate amounts of fertilizer to be applied by units of area.

Examination

The instructor will evaluate, from the ability and skill demonstrated by the students in the practical exercises requested by him, as well as from the replies made to questions asked, the knowledge and ability obtained by the students during the class.

UNIT 3

Subject: Pest control.

Lesson Plan

Class: Application of insecticide.

Objectives:

- a. To instruct the students in the preparation of fumigating equipment.
- b. To teach and train in the adjustment of the various items of equipment utilized in fumigation.
- c. To train the students in the proper manner of applying insecticides.
- d. To instruct them on the protective measures needed in applying insecticides.

Implements and materials

- a. Fumigation equipment.
- b. Insecticides to utilize.
- c. Protection equipment.
- d. Charts and illustrations.

Reference: Instructions on the application of insecticides. Technical Department of INRA.

Preparation

1. Selection of the plot on which exercises in applying insecticides will be held.
2. Preparation of the equipment and ensurance of its availability when the classes are held.
3. Preparation of the insecticides to be used, locating them in a suitable place.
4. Ensurance that the protection equipment is there.

5. Preparation and arrangement of the necessary charts and illustrations.

The class will be given, stressing the importance of the proper application of insecticides to the crop.

The need for taking the necessary precautions to prevent accidents during applications must be emphasized.

Presentation

The instructor will teach the students how to prepare the fumigation equipment, training them in its adjustment.

Application

Under the guidance of the instructor, the students will proceed to prepare and adjust the various types of fumigation equipment. They will make applications of insecticides with the various items of equipment.

They will take the necessary protective measures in making the applications.

Examination

The instructor will evaluate the knowledge and skills developed by the students by asking questions, by asking the students themselves to adjust the equipment to be used and to make applications with the equipment.

Examination

The instructor will have the students identify the pests that attack the crop and he will have them select, dose and prepare the insecticides to be utilized, taking the necessary precautions in handling the products.

The instructor will derive the data needed to evaluate the results of the class from the knowledge and skills demonstrated by the students.